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02/03/2005 04:11 PM

To Christopher Lichens/R9/USEPA/US@EPA
cc Dave Chamberlin <chamberlindc@cdm.com>
bcc
Subject Soil Gas Results, Omega Site

History: This message has been forwarded.

Chris:

Attached for your reference is a copy of the Soil Gas Results from November 2044 (Technical Memorandum and 8 figures).

We can also discuss, if desired, this document tomorrow.

Regards,

Chuck


SG Data Eval Memo - 3.pdf

Fig 3-1.pdf

Fig 3-2.pdf

Fig 3-3.pdf

Fig 3-4.pdf

Fig 3-5.pdf

Fig 3-6.pdf

Fig 3-7.pdf

FIG-2-1.pdf

CDM

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Memorandum

To: *Chris Lichens - USEPA*

From: *John Eisenbeis - CDM*
Sharon Wallin - CDM

Date: *February 3, 2005*

Subject: *Preliminary Evaluation of Soil Gas Results from November 2004*
Omega Chemical Superfund Site
10500-37240-T2.OSS.XTRA
10500-5.2.3

1.0 Introduction

Soil gas sampling at the Omega Chemical site (site) was proposed on behalf of the Omega Chemical Site PRP Organized Group by Camp Dresser & McKee Inc. (CDM) in the *Final On-Site Soils Remedial Investigation/Feasibility Study Work Plan*, dated September 29, 2003. An addendum to the work plan was submitted to EPA on September 24, 2004. EPA provided comments on the addendum in a memorandum from CH2M HILL dated October 1, 2004. Responses to these comments were added to the addendum and it was finalized on October 20, 2004.

Two types of soil gas sampling were proposed and have since been completed:

1. Traditional soil gas sampling from native vadose zone soils (SG -7 through -11 at 18 and 24 feet behind 3 Kings, and SG-13 through -15 at 6 and 12 feet next to Skateland)

2. Sampling from subsurface utility corridors

In the latter case, the objective was to evaluate whether utility corridors have provided subsurface pathways to facilitate the lateral migration of impacted soil gas. A CDM memorandum to EPA dated November 12, 2004 proposed utility corridor soil gas sampling locations. A CDM memorandum dated November 30, 2004 addressed how the soil gas results were to be evaluated and summarized the subsurface conditions that were observed during the sampling which was performed from November 9 - 12, 2004.

2.0 Observations on Subsurface Conditions

As was presented in the November 12, 2004 memorandum, based on the locations of utility corridors, 11 soil sampling holes (Figure 2-1) were placed to measure total volatile organic compounds (VOCs) in soil gas along the utility corridors using a field photoionization detector (PID). The intent of these measurements was to provide a basis for proposing to EPA utility corridor sampling locations for the purpose of evaluating the extent to which the corridors may be acting as preferential pathways for contaminated soil gas. Table 2-1 describes the utility corridors that were sampled, as well as the PID readings that were measured during screening.

Table 2-1
Utility Corridor Screening Locations and PID Results

Location	Utility and Depth	Depth (ft)	PID Reading (ppmv)
1	Water line running in front (along Whittier) of 3 Kings and Star City Auto Body	2	3.7
2	Sewer line tie-in to Skateland (back, western corner of building)	6	21
3	Main sewer line behind Terra Pave (southern-most)	11	20
4a	Main sewer line behind Terra Pave (second southern-most)	9	50
4b	Lateral sewer line to Skateland (mid point)	2	-
5	Main sewer line behind Terra Pave (mid point)	9	46
6	Main sewer line behind Terra Pave (second northern-most)	10	44
7	Main sewer line behind Terra Pave (northern-most)	11	340
8	Water line running in front of Terra Pave (along Putnam)	2	74
9	Sewer line tie-in to Terra Pave	6	26
10	Water line running in front (along Whittier) of Skateland	5	2
11	Main sewer line behind Medlin	11	16
12	Lateral sewer line to Skateland (near assumed entry to bathroom area)	2	-

Note: Location Nos. 4b and 12 were not screened with a PID.

In general, observations made during the soil gas sampling regarding subsurface conditions at or near the site supported CDM's conceptual understanding of the conditions of the shallow subsurface soil. Fill materials are present in some locations at the shallowest depths underlain by moist clayey silts and silty clays. The only observations made during this sampling that differ slightly from this conceptual view of the subsurface were:

- Some cobble was noted at a depth about 4 to 5 feet at utility corridor location 4a
- Some sand was encountered at a depth of about four feet at location 11 that was likely fill material

During sampling of the deeper intervals (18 – 24 feet) at the 3 Kings leased portion of the Omega Site, it was noted that the Geoprobe unit had to use the hammer to drive the probe beginning at about 18 feet (as opposed to just using the weight of the truck to drive the probe). This indicated the presence of soils with lower permeability at these depths. This conclusion was supported during the soil gas sampling at the 24-foot sample depth at two locations (SG-8 and SG-9) by the fact that the summa canisters filled very slowly.

3.0 Evaluation of Soil Gas Results

The November 2004 soil gas data can be grouped into three categories:

1. Samples along the southern end of Skateland (SG-13, -14, and -15)
2. Deep samples (18 and 24 feet) from 3 Kings (SG-7, -8, -9, -10, and -11)
3. Utility corridor samples

The results for each of these categories will be evaluated differently in the following sections. Summary tables that contain the soil gas analytical results are attached to this Technical Memorandum.

3.1 *Samples along the Southern End of Skateland (SG-13, -14 and, -15)*

The Skateland soil gas sample results have been evaluated with the objective of determining whether contaminants were detectable to the south of the Skateland facility. Figure 3-1 presents pie charts with the five main soil gas VOCs detected in on- and off-site soil gas samples [1,1-dichloroethene (1,1-DCE), Freon 113, Freon 11, tetrachloroethene (PCE), and trichloroethene (TCE)] for on-site locations and the three locations south of Skateland. The four most likely scenarios that could have produced these results are:

1. Soil gas impacted by contaminated soils underlying the former Omega property has migrated horizontally in native shallow soils beneath Skateland.
2. Contamination in groundwater underlying the former Omega property has partitioned into soil gas which has then migrated horizontally to native shallow soils beneath Skateland.
3. Groundwater underlying Skateland has elevated levels of contaminants that have partitioned into soil gas which has then migrated vertically to native shallow soils beneath Skateland.
4. Soil gas is migrating from contaminated soils underlying the Skateland property.

Regarding relative concentrations of PCE, TCE and 1,1-DCE in on-site soil gas adjacent to Skateland, the results for the combination of these compounds for samples collected from a depth of 6 feet (SG-7, -8, and -9 from April 2004) ranged from 710 to 1,790 milligrams per cubic meter (mg/m^3). The 6 foot samples from south of Skateland (SG-13, -14, and -15) ranged in concentration from 7.1 to 385 mg/m^3 for these three compounds combined (Table 3-1). Since the actual migration pathway is not known, comparing relative concentrations is largely speculative.

3.2 Deep Samples (18 and 24 feet) from 3 Kings (SG- 7, -8, -9, -10, and -11)

The VOC results for the deep soil gas samples at 3 Kings have been compared to the VOC results for samples collected in April 2004 at the same locations but at shallower depths of 6 and 12 feet. The objective was to determine the general vertical profiles of soil gas VOCs to help in determining if VOCs are partitioning from underlying contamination. Figures 3-2 through 3-6 show the vertical profiles of the five main contaminants and total VOCs (TVOCs) for the five 3 Kings locations where soil gas samples have been collected at multiple depths down to 24 feet. Evaluation of these figures indicates that for locations SG-7, -8, -10 and -11 TVOC concentrations and compositions are similar going from 6 to 24 feet in depth. The results at SG-9 show a general declining trend in TVOC concentration with increasing depth. This may be a result of the lower permeability soils that were encountered at about 24 feet at this location, as described in Section 2.0 above. Generally, the deep soil gas sample results did not indicate significant vertical attenuation.

These general trends indicate that soil gas VOCs are likely emanating from deep (>24 feet) subsurface soil and/or groundwater. Data that will be collected from the proposed SVE pilot testing will include VOC extraction rates from various depths at the site. These data will further help to determine the relative vertical distribution of VOCs in the vadose zone, as well as provide a basis to design a full-scale SVE system, if appropriate.

3.3 Utility Corridor Samples

The utility corridor VOC soil gas results have been compared to the existing soil gas VOC results to help address three questions:

1. Are the VOC fingerprints in the utility corridor samples similar to nearby soil gas fingerprints?

2. Are contaminant concentrations in the utility corridor samples similar to nearby soil gas concentrations?

3. Does the distribution of VOCs in utility corridors suggest that the corridors may be a significant migration pathway to adjacent buildings?

Responses to these questions are provided below.

3.3.1 Comparison of Utility Corridor and Soil Gas VOC Fingerprints

Figure 3-7 presents pie charts showing the concentration ratios of VOCs in existing soil gas samples and from utility corridors both on and off the site. Figures 3-1 and 3-7 show there is similarity among fingerprints from samples collected from utility corridors and adjacent soil gas fingerprints (for example, compare the pie charts for UC-5 and UC-3 to SG-10, and compare UC-4B to SG-9).

In addition, a qualitative analysis of these charts and the ones in Figure 3-1 indicates the following general observations:

- Shallow (< 24 feet) samples collected from the southwest portion of the site (soil gas and utility corridor gas samples) had a significantly greater percentage of PCE and lesser percentage of Freons (both Freon 11 and Freon 113).
- The percent of PCE in the SG-9 sample at 24 feet was significantly less than that of all other samples from the southwest portion of the site. However, during sampling this location was found to exhibit lower permeability soils at 24 feet.
- The VOC fingerprints of utility corridor gas samples were reflective of those of nearby soil gas samples.
- The four highest TVOC concentrations (UC-6, -7, -8, and -9) were adjacent to the Terra Pave property in the main sewer line along the southwest fence line of the former Omega property and in a water line along the south side of the Terra Pave building.
- The Freons component becomes more significant along the main sewer line towards the Medlin & Son facility (UC-11) and also in the indoor air sample from Medlin, suggesting a Freon source in this area is possible.
- VOC concentrations in the samples collected adjacent to the water line to the northeast (UC-1 and -10) were significantly lower than those detected in the sample collected from the water line to the southwest (UC-8).

3.3.2 *Comparison of VOC Concentrations and Distribution*

The TVOC concentrations in samples collected from utility corridors adjacent to Skateland are roughly two orders of magnitude lower than those in samples at SG-13 and SG-14 at 12 feet. This suggests either significant attenuation between the deeper soils and the shallow (< 12 feet) utility corridors or is indicative of venting. The alley that contains this utility corridor was excavated and the sewer pipe was replaced in early 2004; additionally, this alley is one of the few locations within the Whittier Blvd. /Putnam St. block that has an unpaved surface. The TVOC concentrations in samples collected from the utility corridor between the Omega and Terra Pave properties are inconsistent when compared to the adjoining soil gas results. The two samples to the north of this corridor (UC-6 and -7) have nearly identical PCE and TVOC concentrations as the corresponding soil gas results (SG 10 and -12). However, the two southerly samples (UC-3 and -5) had significantly lower PCE concentrations, and significantly higher ratios of Freons.

However, it is possible that utility lines may provide migration pathways from shallow soils that contain contaminated soil gas. Prior to the sealing of wall openings that was performed within Skateland in December 2004, these openings and the adjacent utility corridors were a possible conduit for vapors beneath or adjacent to the building. The sealing of these openings directly addressed this possible migration pathway. A sub-slab depressurization (SSD) system at Skateland, one mitigation option that is being evaluated, would also address this pathway.

Indoor air VOC concentrations in samples collected within Skateland in May 2004 were compared to the VOC results for soil gas samples collected next to Skateland and utility corridors next to Skateland (see Figures 3-1 and 3-7). This comparison showed that the indoor air fingerprint at Skateland was very similar to that of the sample collected from the sewer tie-in line at Skateland (UC-2), but considerably different from the fingerprint for samples collected from this line as it passes northeast to enter the building at the bathroom area (northeast corner of the building) and from the nearby soil gas results. PCE was present in Skateland indoor air at a higher percentage (>60%) compared to the other utility corridor samples and soil gas samples SG-7 through SG-9 and SG-13 through SG-15 (ranges from 2% to 30%). Conversely, Freons were present in Skateland indoor air at a lower percentage (<30%) compared to the other utility corridor samples and soil gas samples SG-7 through SG-9 and SG-13 through SG-15 (ranges from 45% to 90%). However, this could be due to an internal Skateland source of PCE such as skate cleaning fluid or wood floor cleaning and care products. According to a chemical use survey completed May 28, 2004 by CDM, PCE was present in a finish used on the wood skating rink floor in April 2004, approximately four weeks prior to the initial indoor air sampling event.

3.4 Potential Transport Mechanisms

Overall, it seems that VOCs could migrate into Skateland via a combination of the following pathways:

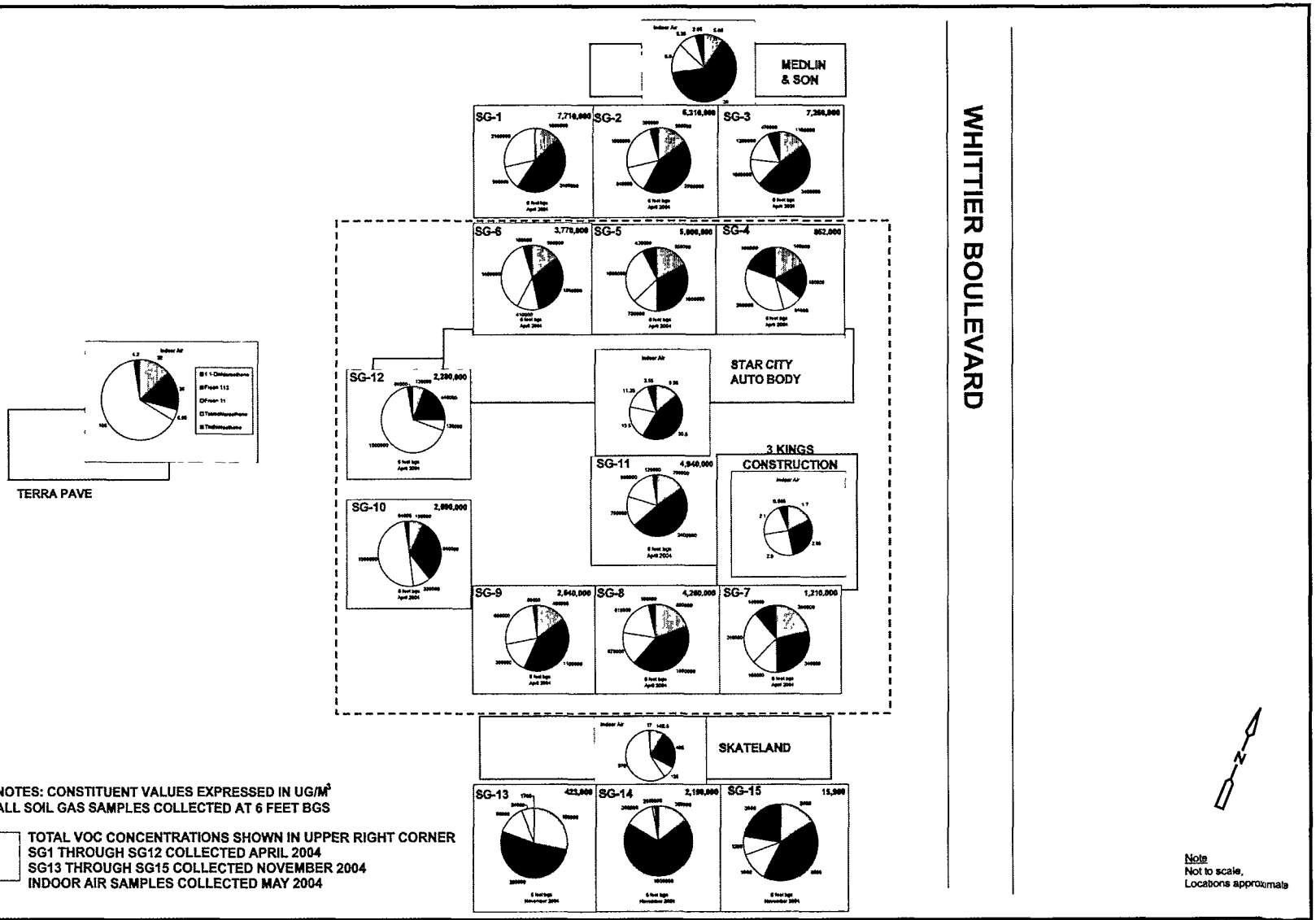
1. Transport of soil vapors off-gassing from deep aqueous phase contaminants underlying Skateland

2. Lateral transport in soil gas in shallow native soils beneath Skateland

3. Transport from shallow soils as soil gas through the fractures and holes in the building slab and into Skateland

4. Transport from shallow soils as soil gas to utility corridors through the building slab and/or walls and into Skateland

An SSD system at Skateland would directly address indoor air quality at Skateland. Therefore, future investigation will focus on collecting information to support evaluation of remedial actions regarding Skateland.



OMEGA CHEMICAL

Pie Graphs of Soil Gas Samples and Indoor Air Samples
5 Primary Constituents
Approximate Spatial Distribution

Figure 3-1

CDM

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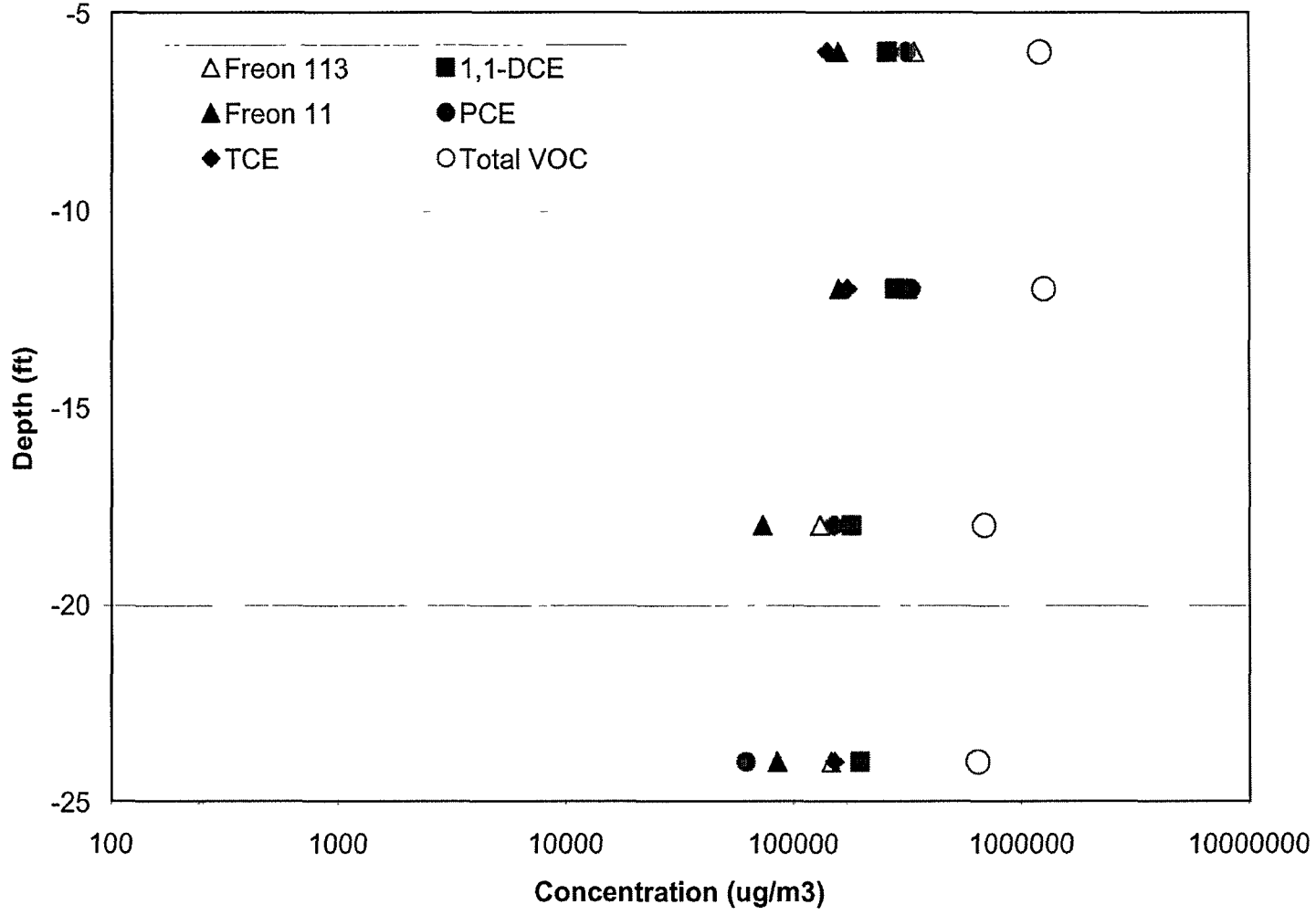

OMEGA CHEMICAL

Soil Gas Concentrations at SG-7

CDM

Figure 3-2

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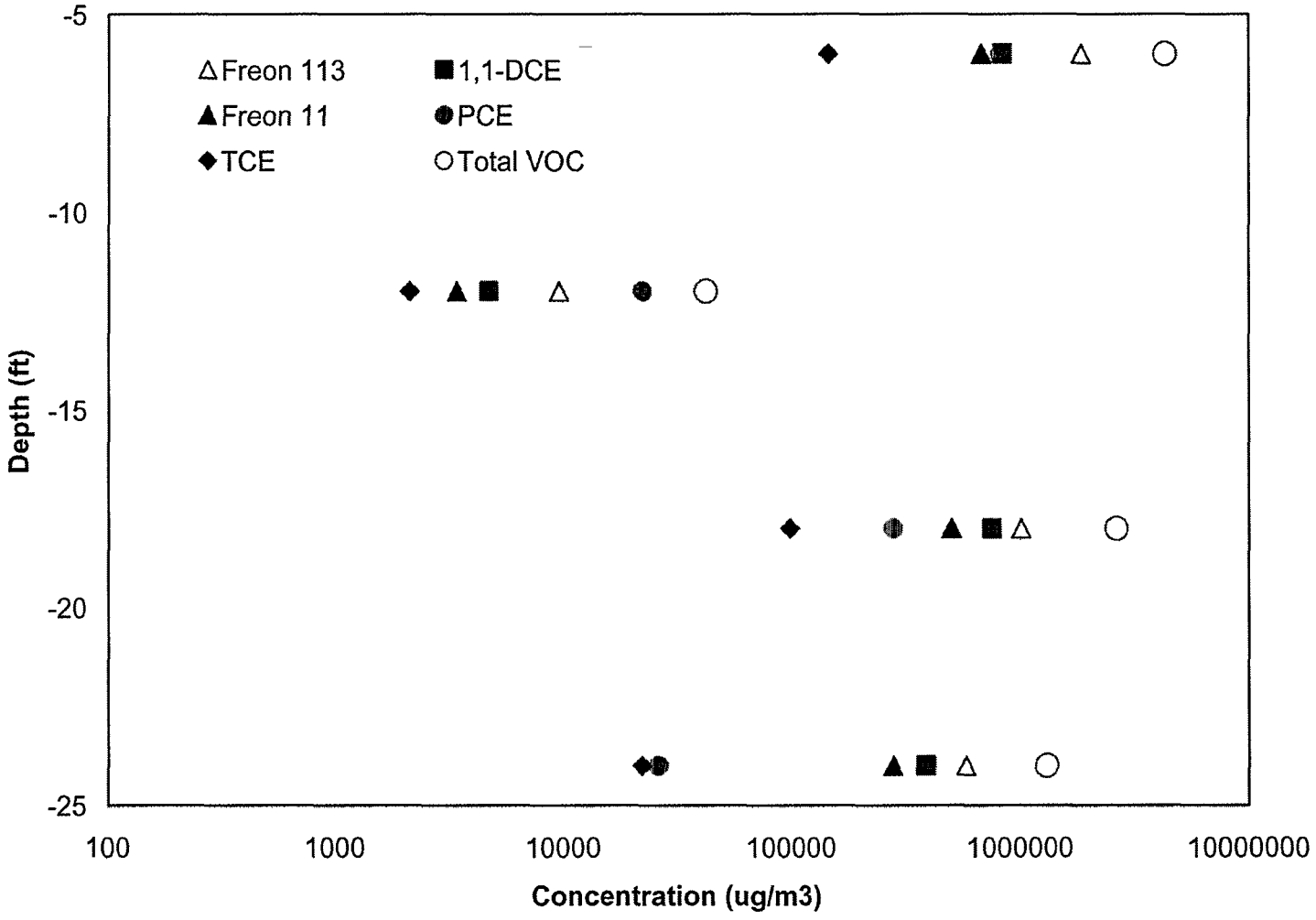

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Soil Gas Concentrations at SG-8

CDM

Figure 3-3

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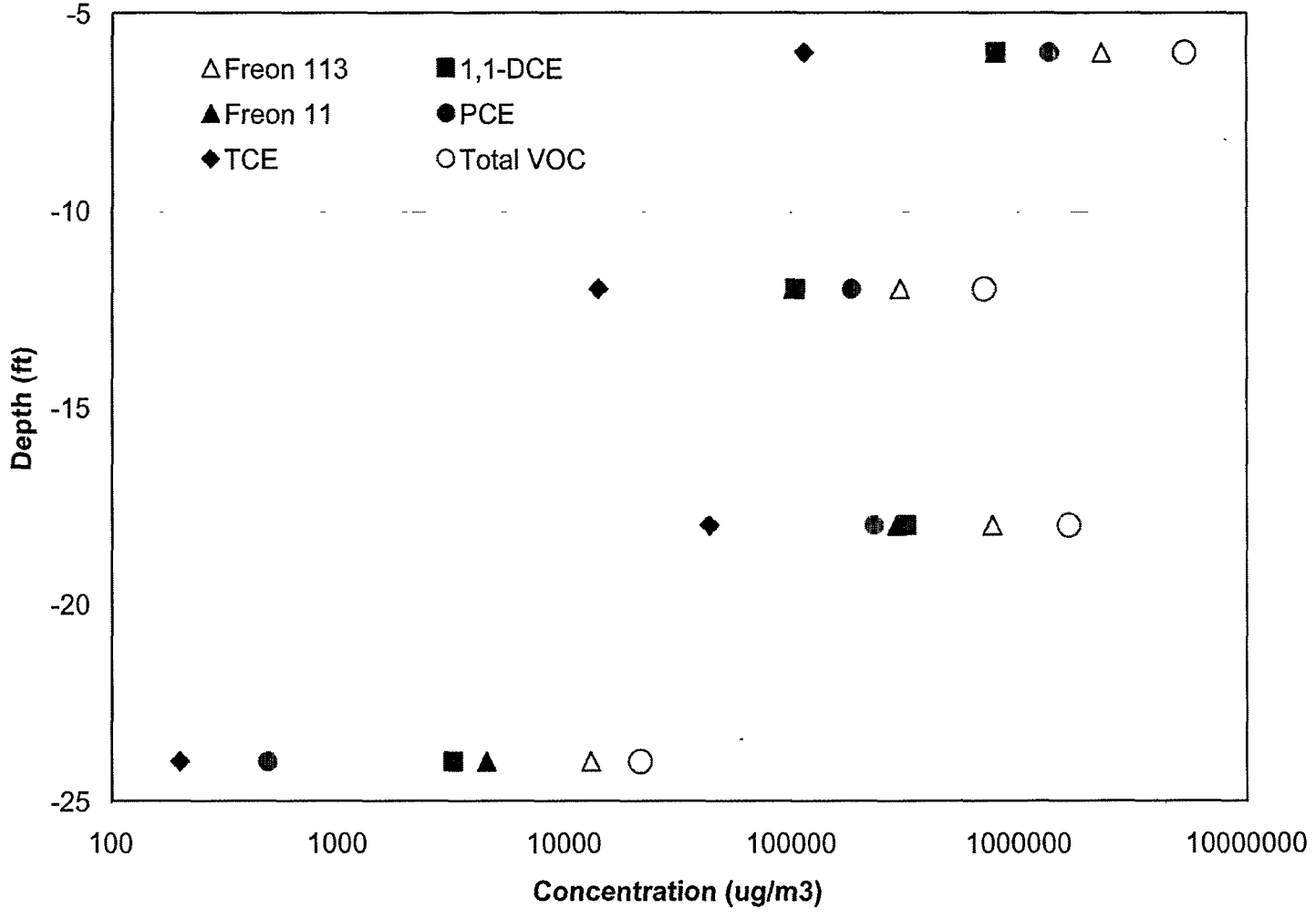

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Soil Gas Concentrations at SG-9

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Figure 3-4

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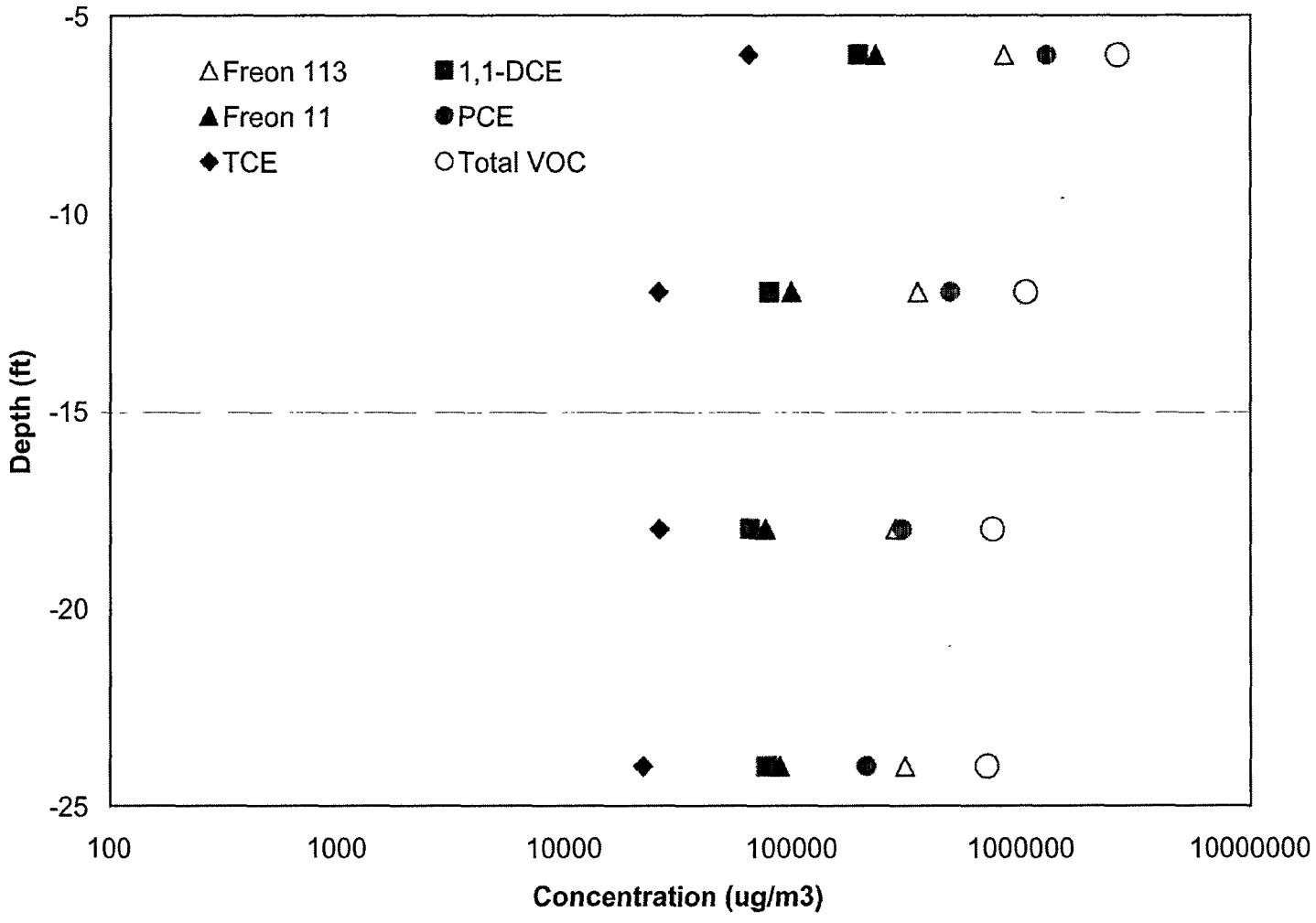

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Soil Gas Concentrations at SG-10

CDM

Figure 3-5

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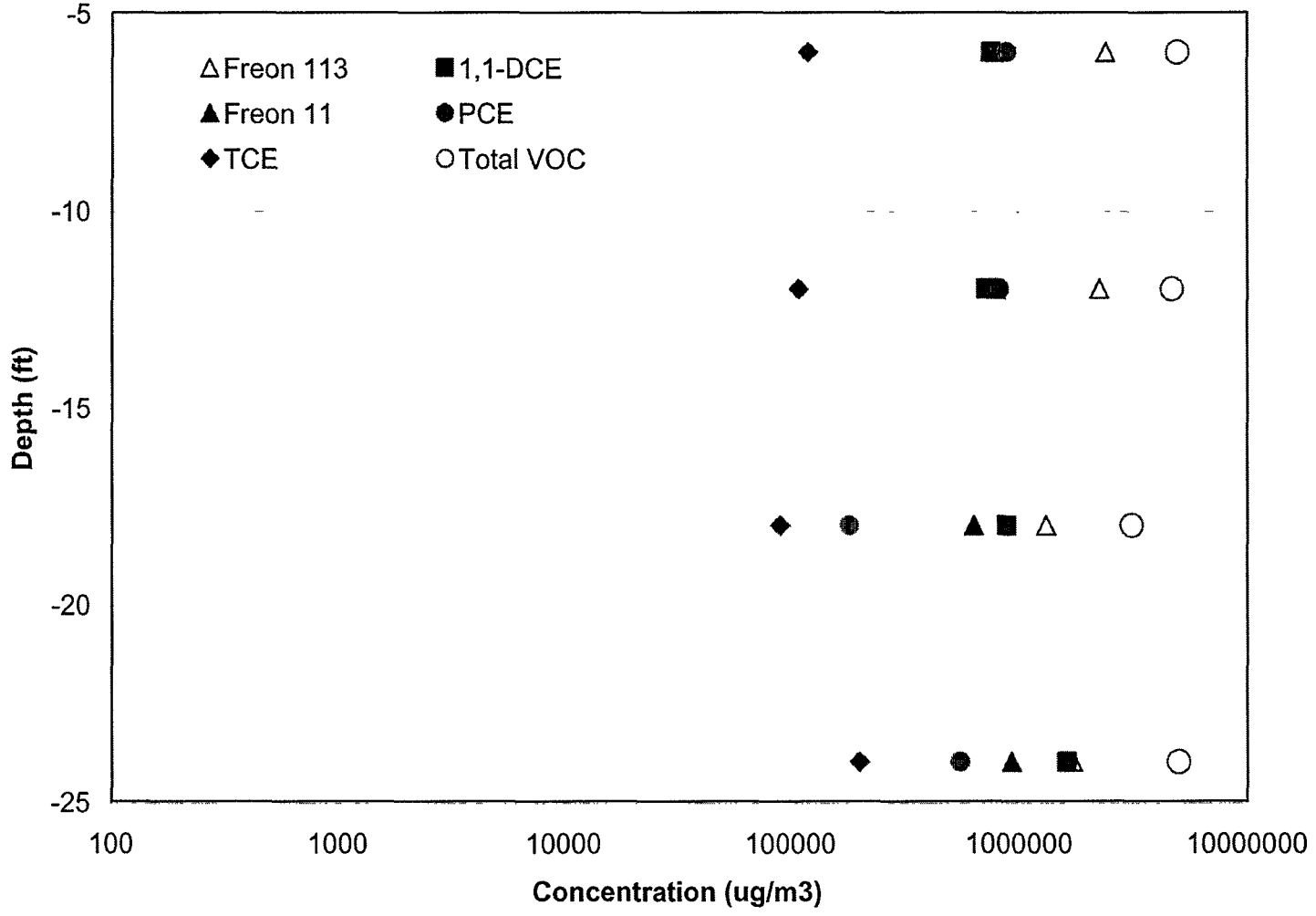

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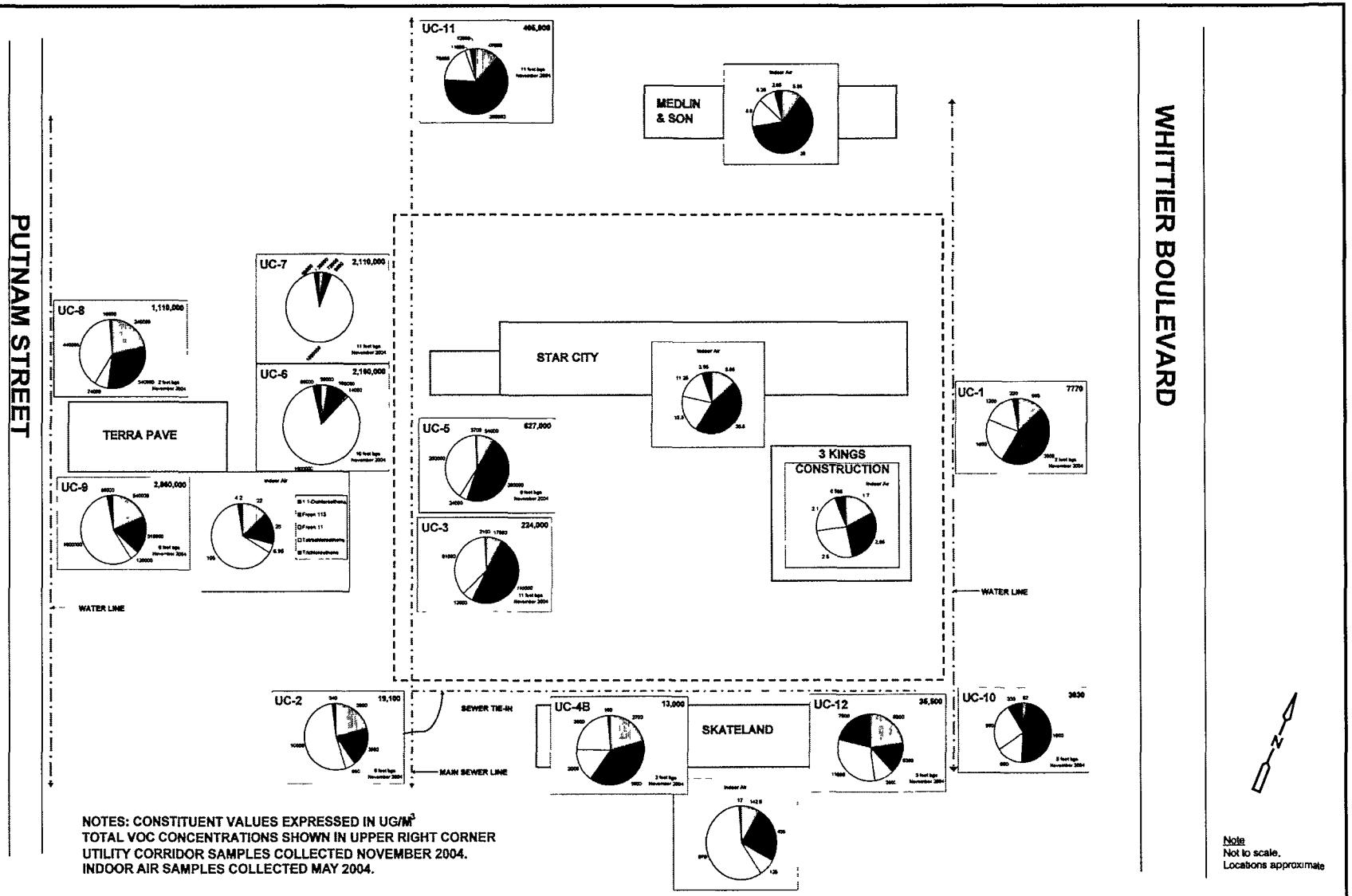
Soil Gas Concentrations at SG-11

CDM

Figure 3-6



OMEGA CHEMICAL

Pie Graphs of Soil Gas Samples from Utility Corridors
5 Primary Constituents
Approximate Spatial Distribution

Figure 3-7

CDM

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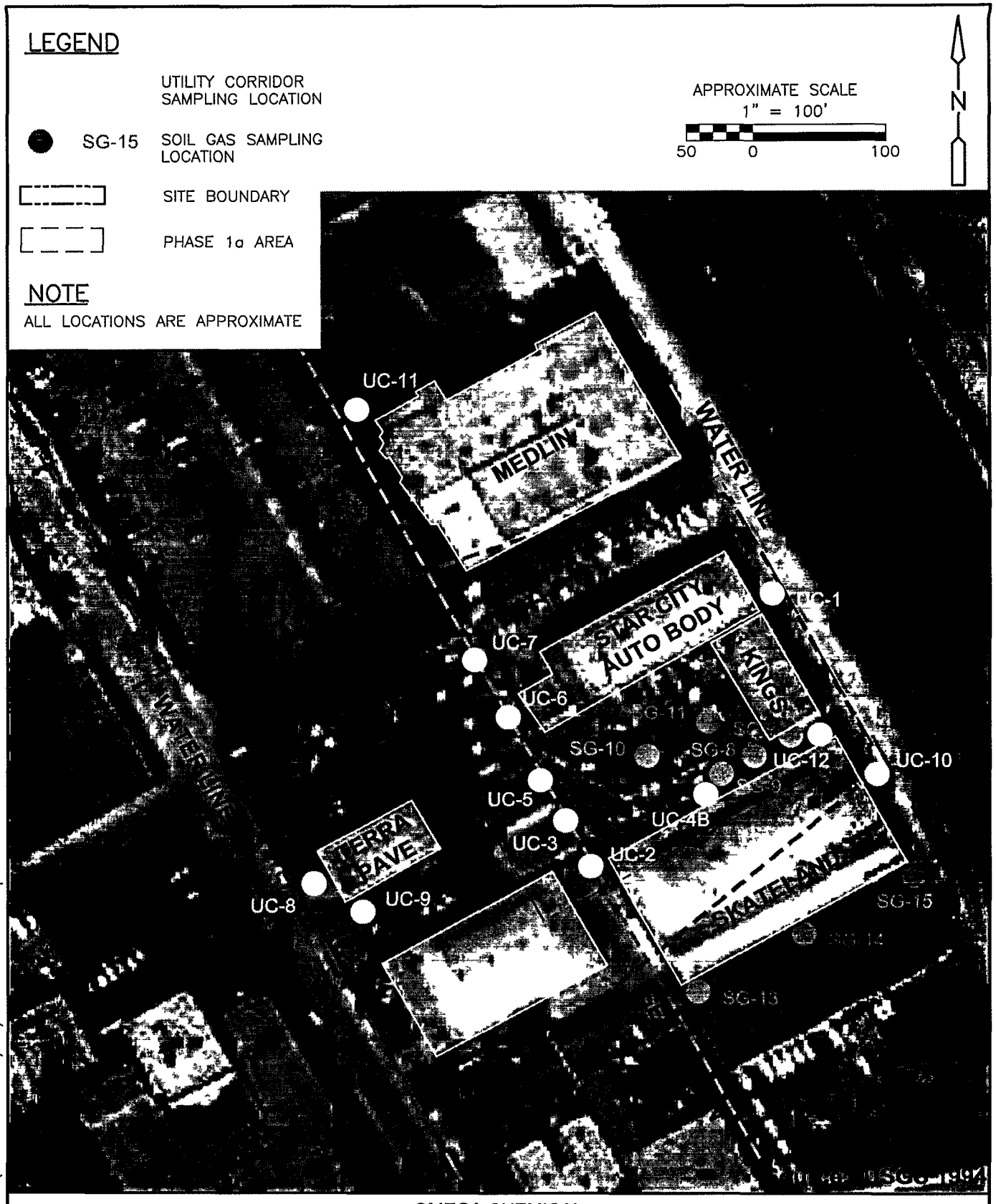

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Utility Corridor and Skateland
Soil Gas Sampling Locations - November 2004

CDM

Figure 2-1

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